

What is claimed is:

1. A radiation image processing apparatus, comprising:
an object region extracting means that detects an amount of radiation energy transmitted through a object and extracts an object region where the object is radiographed for the radiation image corresponding to the amount of the detection; and
a contour recognizing means that recognizes a contour based on the object region extracted by the object region extracting means, wherein the contour recognizing means extracts a feature amount.
2. The radiation image processing apparatus according to Claim 1, wherein the contour recognizing means uses a position change of a boundary of the object region.
3. The radiation image processing apparatus according to Claim 2, wherein the contour recognizing means comprises
a region boundary point detecting means that detects a boundary of the object region,
a position change amount calculating means that calculates a position change amount of a boundary of the

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object region from plural region boundary points detected by the region boundary point detecting means, and

a contour specifying means that specifies a contour from the position change amount calculated by the position change amount calculating means,

wherein the region boundary point detecting means uses plural different scanning lines which scan successively from one end to the other end of an image with respect to one or both of the horizontal and vertical directions, and extracts a target pixel as a region boundary point when the target pixel existing on each scanning line is included in the object region and an arbitrary neighbor pixel near the target pixel is not included in the object region,

wherein the position change amount calculating means obtains an amount of position change from another adjoining region boundary point with respect to all or plural arbitrary region boundary points, and

wherein the contour specifying means specifies a contour by classifying plural position change amounts into plural patterns prepared in advance.

4. The radiation image processing apparatus according to Claim 3, wherein the position change amount is a distance between neighboring region boundary points.

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5. The radiation image processing apparatus according to Claim 3, wherein the position change amount is an amount of a change in coordinates between neighboring region boundary points in one or both of the horizontal and vertical directions.

6. The radiation image processing apparatus according to Claim 1, wherein the contour recognizing means uses local region widths of the object region.

7. The radiation image processing apparatus according to Claim 6, wherein the contour recognizing means comprises
a region boundary point detecting means that detects a boundary of the object region,

a region width calculating means that calculates local region widths of the object region from plural region boundary points detected by the region boundary point detecting means, and

a contour specifying means that specifies a contour from the region widths calculated by the region width calculating means,

wherein the region boundary point detecting means uses plural different scanning lines which scan successively from

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one end to the other end of an image with respect to one or both of the horizontal and vertical directions, and extracts a target pixel as a region boundary point, when the target pixel existing on each scanning line is included in the object region and an arbitrary pixel near the target pixel is not included in the object region,

wherein the region width calculating means calculates a distance between plural region boundary points among the region boundary points existing on the same scanning line as a region width for each of the plural scanning lines, and

wherein the contour specifying means specifies a contour by classifying the contour into plural patterns prepared in advance, from the region width for each of the plural scanning lines.

8. The radiation image processing apparatus according to Claim 1, wherein a body part or a posture of an object in a radiation image is recognized by using a feature amount obtained in the contour recognizing means stated above.

9. The radiation image processing apparatus according to Claim 1, further comprising a radiographing orientation judging means for judging a radiographing orientation for an object from the contour based on the feature amount.

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10. The radiation image processing apparatus according to Claim 1, wherein the contour recognizing means recognizes a portion where a boundary line between the object region and a region other than the object region changes to be in a concave form or in a convex form.

11. A radiation image processing apparatus, comprising:

a signal variance extracting means that detects an amount of radiation energy transmitted through an object and calculates a signal variance between an arbitrary pixel and neighboring pixels around the arbitrary pixel on the radiation image corresponding to an amount of the detection;

a pattern detecting means that detects one or plural patterns from spatial distribution and intensity distribution of the signal variances obtained by the signal variance extracting means; and

a feature amount extracting means that extracts a feature amount based on the pattern detected by the pattern detecting means.

12. The radiation image processing apparatus according to Claim 11, further comprising an object region extracting means that detects an amount of radiation energy transmitted

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through an object and extracts an object region where the object is radiographed for the radiation image corresponding to an amount of the detection,

wherein the signal variance extracting means calculates a signal variance between an arbitrary pixel and neighboring pixels which are included in the object region extracted by the object region extracting means.

13. The radiation image processing apparatus according to Claim 11, wherein the signal variance extracting means calculates the primary differential value between neighboring pixels.

14. The radiation image processing apparatus according to Claim 11, wherein the signal variance extracting means calculates the secondary differential value between neighboring pixels.

15. The radiation image processing apparatus according to Claim 11, wherein the pattern detecting means divides the radiation image into plural regions, totalizes the number of pixels each having the similar spatial inclination direction of the signal variance for pixels each being in each divided region and having the amount of the prescribed signal

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variance more than the prescribed amount and detects a pattern based on the results of the totalization.

16. The radiation image processing apparatus according to Claim 11, wherein the pattern detecting means detects the continuous pixels as one pattern, when the amount of the signal variance between neighboring pixels obtained by the signal variance extracting means is more than a prescribed amount and pixels having the substantially same spatial inclination direction of the signal variance exist continuously in one direction by a number more than a prescribed number.

17. The radiation image processing apparatus according to Claim 11, further comprising a means to recognize a body part of an object and the radiographing orientation in a radiation image by using the obtained feature amount.

18. The radiation image processing apparatus according to Claim 11, further comprising a contour recognizing means that recognizes a contour of the object region extracted by the object region extracting means is further provided, and

wherein the radiographing orientation judging means judges the radiographing orientation for an object based on

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information of the contour obtained by the contour recognizing means and on spatial distribution of pixels extracted by the signal variance extracting means.

19. The radiation image processing apparatus according to Claim 18, further comprising a contour recognizing means that recognizes a contour of the object region extracted by the object region extracting means is further provided, and

wherein the radiographing orientation judging means judges the radiographing orientation for an object based on information of the contour obtained by the contour recognizing means and on spatial distribution of pixels extracted by the signal variance extracting means.

20. The radiation image processing apparatus according to Claim 19, wherein the radiographing orientation judging means judges that the radiographing orientation is the direction from side to side, when the object is judged to be radiographed in the direction from side to side of the object based on even one of the results of judgment from the contour information and the results of judgment from the prescribed spatial distribution.

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21. The radiation image processing apparatus according to Claim 19, wherein the radiographing orientation judging means judges that the radiographing orientation is the direction from side to side, when the object is judged to be radiographed in the direction from side to side of the object based on both of the results of judgment from the contour information and the results of judgment from the prescribed spatial distribution.

22. The radiation image processing apparatus according to Claim 18, wherein the contour recognizing means recognizes a portion where a boundary between the object region and an object region changes to be concave or convex.

23. The radiation image processing apparatus according to Claim 18, wherein the signal variance extracting means calculates an amount of a signal variance between neighboring pixels by the secondary differentiation with respect to an arbitrary pixel in the object region, and extracts pixels amounting to 5 - 40% of the total pixels included in the object region in the order wherein the greatest absolute value of the signal variance amount comes first.

24. A radiation image processing apparatus, comprising:

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a plurality of feature extracting means each detecting an amount of radiation energy transmitted through an object and extracting a feature amount for the radiation image corresponding to an amount of the detection; and

a feature amount correctness judging means that judges correctness with the feature amount by combination of plural feature amounts obtained from the plural feature extracting means,

wherein a radiographed body part of the object and the radiographing orientation are specified based on the approved feature amount by the feature amount correctness judging means.

25. The radiation image processing apparatus according to Claim 24, further comprising an object region extracting means that detects an amount of radiation energy transmitted through an object and extracts an object region where the object is radiographed, for the radiation image corresponding to an amount of the detection, and

wherein a plurality of feature amounts are extracted from the object region extracted by the object region extracting means.

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26. The radiation image processing apparatus according to Claim 25, wherein each of the plural feature amount extracting means comprises an edge feature amount extracting means that extracts a feature amount based on a signal variance calculated between one pixel and neighboring pixels included in the object region extracted by the object region extracting means, and a contour feature amount extracting means that extracts a feature amount from a contour of the object region extracted by the object region extracting means.

27. The radiation image processing apparatus according to Claim 26, wherein the edge feature amount extracting means comprises an edge detecting means that extracts a pixel whose signal variance amount from a neighboring pixel satisfies the predefined conditions, for an optional pixel included in the object region extracted by the object region extracting means, and an edge pattern detecting means that extracts a feature amount of an object based on spatial distribution of the pixel extracted by the edge detecting means.

28. The radiation image processing apparatus according to Claim 26, wherein the contour feature amount extracting means comprises a region boundary point detecting means that

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detects a boundary of the object region, a position change amount calculating means that calculates a position change amount of a boundary of the object region from plural region boundary points detected by the region boundary point detecting means, and a contour specifying means that specifies a contour from the position change amount calculated by the position change amount calculating means, and

wherein the region boundary point detecting means uses plural different scanning lines which scan successively from one end to the other end of an image with respect to one or both of the horizontal and vertical directions, and extracts a target pixel as a region boundary point, when the target pixel existing on each scanning line is included in the object region and an arbitrary pixel near the target pixel is not included in the object region,

wherein the position change amount calculating means obtains an amount of position change from another adjoining region boundary point with respect to all or plural region arbitrary boundary points, and

wherein the contour specifying means specifies a contour by classifying plural position change amounts into plural patterns prepared in advance.

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29. The radiation image processing apparatus according to Claim 25, wherein the feature amount correctness judging means judges correctness of the feature amount based on a size of the object region extracted as the feature amount.

30. A radiation image processing method, comprising steps of:

detecting an amount of radiation energy transmitted through an object;

extracting an object region where the object is radiographed for a radiation image corresponding to an amount of the detection;

recognizing a contour based on the object region extracted; and

extracting a feature amount.

31. A radiation image processing method, comprising steps of:

detecting an amount of radiation energy transmitted through an object;

detecting a signal variance between a pixel and the neighboring pixels on the radiation image corresponding to an amount of the detection;

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detecting one or plural patterns from spatial distribution and intensity distribution of the obtained signal variances; and

extracting a feature amount based on the pattern detected by the pattern detecting means.

32. A radiation image processing method, comprising steps of:

detecting an amount of radiation energy transmitted through an object;

extracting plural feature amounts for a radiation image corresponding to an amount of the detection;

judging correctness of the feature amount by combination of plural obtained feature amounts; and

specifying a body part of the object or the radiographing orientation based on the results of the correctness judgment.

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